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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/664,937	09/19/2000	Tong Fang	00P7900US	5212

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EXAMINER

ROSARIO-VASQUEZ, DENNIS

ART UNIT PAPER NUMBER

2621

DATE MAILED: 08/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No. 09/664,937	Applicant(s) FANG ET AL.	
Examiner Dennis Rosario-Vasquez	Art Unit 2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE THREE MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on September 19, 2003.
- 2a) This action is FINAL.
- 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-18 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-5, 7-13 and 15-17 is/are rejected.
- 7) Claim(s) 6, 14 and 18 is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) The proposed drawing correction filed on _____ is: a) approved b) disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. _____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) The translation of the foreign language provisional application has been received.
- 15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) Interview Summary (PTO-413) Paper No(s). _____
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other:

DETAILED ACTION

Specification

The disclosure is objected to because of the following informalities:

1. On page 12, line 3 the typographical error "scam" should be replaced with "scan".
Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1,3,8,9,11 and 15 are rejected under 35 U.S.C. 102(e) as being anticipated by Sundar et al. (US Patent 6,198,976 B1).
3. As applied to claim 1, which is representative of claims 8, 9, Sundar et al. teaches a method for determining a circle in a region of interest comprising the steps of:

Extracting a first pair and a second pair of edge points from a region of interest.

The region of interest in Sundar et al. is the substrate 140 in Figure 7. A first pair of edge points consists of data points 223 and 224 and the second pair of edge points consists of data points 222 and 225.

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Determining an intersection of a first and second line extending perpendicular from a pair of midpoints of the first and second pair of edge points respectively. Sundar et al. calculates the perpendicular bisectors 236, 238 of figure 7, and calculates the intersection of the perpendicular bisectors at the center point 230.

Determining a radius from the intersection to any edge point. Sundar et al. states "...the distances [or radius] from the center 230 [of figure 7] to the data points of the chords are calculated...(see column 10, lines 50-54)."

4. In regard to claims 3 and 11, Sundar uses a substrate center-finding system to find a circular substrate as the region of interest (see col. 4, line 51 and col. 5, line 22), and the circular substrate is the dominant feature or object utilized by the center-finding system to find certain characteristics of the circular substrate (see figure 7). Thus, the circle is the dominant feature as called for in claims 3 and 11.

5. In regard to claim 15, which differs from claim 1 only in requiring a computer program product comprising a computer usable medium having a computer readable code embodied therein. Note that Sundar et al. uses a computer program product for causing the computer to detect a circle within an image. Sundar states, "[A] controller 133 [can be used] in computing the center coordinates of the substrate (see col. 7, lines 12-16 and figure 4)." Note also the reference to "instructions" from the controller at col. 6, lines 46-48. Those instructions would inherently be embodied in a computer usable medium as called for in claim 15.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 4,5,12,13,16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sundar et al. as applied to claims 1,8, and 15 above, and further in view of Yamagata (U.S. Patent 6,021,222).

7. Claim 4, which is representative of claims 12 and 16, calls for the additional steps of:

Scanning the image along the x and y axis of the region of interest.

Performing a horizontal and vertical gradient along the x and y-axis of the region of interest.

Determining whether a local maximum along the gradients match the coordinates for any edge point.

The additional elements of claim 4 above are absent from the Sundar et al. reference, but it's clearly shown in the Yamagata reference. For instance, Yamagata teaches:

Scanning the image along the x and y axis of the region of interest. Yamagata explains "...two orthogonal directions...in a coordinate system describ[es] the scanned image (see column 4, lines 29-31)."

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Performing a horizontal and vertical gradient along the x and y-axis of the region of interest. Yamagata states "...the Sobel operator...[calculates] the gradient vector...[and]... uses the "east" (right) and "south" (down) directions as the...directions in a coordinate system (see column 4, lines 22-23,32-34)." Note also Figure 5B where the "SOUTH" operator corresponds to the horizontal gradient and the "EAST" operator corresponds to the vertical gradient.

Determining whether a local maximum along the gradients match the coordinates for any edge point. Yamagata states "...if the difference in intensities is a local maximum.... then the given image pixel is considered an edge pixel (see column 5, lines 15-17)."

Note that Sundar et al. detects the edge points of a circular substrate using a "bank of sensors" which send trigger signals to the controller (see Sundar: col. 6, lines 24-28). On the other hand, Yamagata detects the edge points of a circle using techniques of digital image processing whereby an image is first transformed into digital data to be processed by a digital computer (see Yamagata: col.1, lines 15 et seq.). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the edge detecting technique taught by Yamagata in Sundar's system by replacing the "bank of sensors" with digital image processing because Sundar already contemplates the use of digital image processing to compute the center coordinate of a circle.

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8. As to claim 5, which includes the additional step of searching from each edge of the region of interest inward, Yamagata states, "...the Sobel operator is applied in two orthogonal directions to the intensity values [of pixels]... (see col. 4, lines 26-29)." Note that the Sobel operator uses the "east"(right) and "south"(down) or "north"(up) and the "west" (left) as the orthogonal directions as inward directions of the region of interest or document (see col. 2, lines 44-45, col. 4, lines 30-31, 42, 43 and figure 5B). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the teachings of Yamagata to use the Sobel operator to define edge features of various shapes.

9. Claims 13 and 17 are rejected for the same reasons of claim 5 above.

10. Claims 2 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sundar et al. as applied to claims 1 and 8 above, and further in view of Huber (U.S. Patent 4,523,188).

11. Claim 2 states that the x-axis and the y-axis intersect within the circle using the method of claim 1. The Sundar et al. reference finds the intersection of any 2 chords' perpendicular bisectors within a circle, and does not teach that the x-axis and the y-axis intersect within the circle for finding the intersection of the perpendicular bisector (see col. 10, lines 43-47). However, Sundar et al. does mention any 2 chords within a circle can be used to find the perpendicular bisector; therefore the first chord can be horizontal and the second chord can be vertical. The Huber reference uses a coordinate system for finding the misalignment of the center of a circle with respect to the coordinate system's origin (see col. 1, lines 45-49). Additionally, Huber's coordinate

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system has an x and y-axis intersected within a circle as indicated within figures 1 and 2 (see col. 2, lines 44,45). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the coordinate system of Huber with Sundar's circle to determine the position of each the said horizontal and said vertical chords within Sundar's circle using Huber's coordinate system to locate a spatial relationship of Sundar's circle to other objects.

12. Claim 10 is rejected for the same reasons as claim 2.

13. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sundar et al.

14. Claim 7 requires a manual procedure for selecting the region of interest. Sundar et al. states, "Based on positional feedback...the controller can determine the...center of a substrate [or region of interest] (see col. 6, lines 31-35).". It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the teachings Sundar et al., because if Sundar et al.'s automatic feedback procedure was removed, a manual procedure for finding the region of interest will be used by default. Moreover, a selection done by machine can obviously be done manually.

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Conclusion

19. Claims 6,14 and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Allowable Subject Matter

The following is a statement of reasons for the indication of allowable subject matter:

20. Claim 6 is allowable over the art of record for requiring that if a foreign structure is both inside and outside the circle, randomly scan at a plurality of points each axis of the region of interest within $\frac{1}{2}$ of the total axis length and calculating a median value for each coordinate of the center of the circle. None of the art of record teaches or suggests this feature within a method as called for in claim 6 and its parent claims.

21. Claims 14 and 18 are allowable over the art of record for the same reasons as claim 6 above.

22. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Itsuzaki et al. (U.S. Patent 5,995,663) teaches a method to detect a shape using multiple windows for scanning.

De Queiroz et al. (U.S. Patent 5,892,854) teaches a method to detect a shape within an image using binary moments and a bounding rectangle.

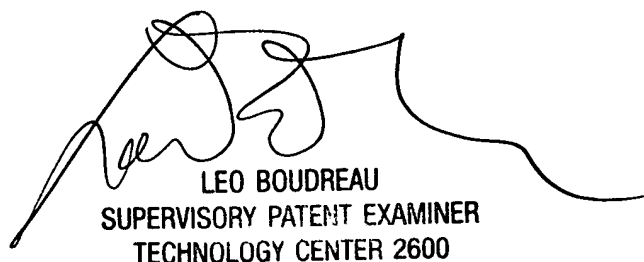
Tsuboi et al. (U.S. Patent 5,825,914) teaches a method to find the center of objects using an ellipse approximation to find the edges and a histogram for finding the center.

Palmquist et al. (U.S. Patent 5,179,419) teaches a method of identifying foreign objects on the end-face of a fiber optic cable using a line matching procedure.

23. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dennis Rosario-Vasquez whose telephone number is 703-305-5431. The examiner can normally be reached Monday thru Friday from 9AM to 5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo Boudreau, can be reached on (703) 305-4706. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9314 for regular communication and 703-872-9313 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed customer service whose telephone number is 703-306-0377.



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